

NON-PUBLIC?: N
ACCESSION #: 8903170289
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Oconee Nuclear Station, Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000270

TITLE: Turbine/Reactor Trip Due to Unknown Cause
EVENT DATE: 02/05/89 LER #: 89-003-00 REPORT DATE: 03/07/89

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: H. R. Lowery,
Oconee Safety Review Group TELEPHONE: 803-885-3034

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On February 5, 1989, at 0023 hours while operating at 100% full power, the Unit 2 Main Turbine (MT) tripped resulting in an anticipatory reactor trip. The MT tripped immediately following the performance of step 2.2 of procedure PT/2/B/290/05 (Secondary Systems Protection Test), which placed the Master Trip Solenoid test lever in the trip "A" position. A work request was written to investigate the Master Trip Solenoid test switch. However, investigation into the incident did not identify the cause of the MT trip. The immediate corrective action was to stabilize the unit at hot shutdown. The supplemental corrective actions included troubleshooting the Electro Hydraulic Control System and replacing the Master Trip Solenoid test switch as a precautionary measure. The root cause of the unit trip could not be determined because the scenario was not repeatable. Therefore, this incident is classified as unknown.

END OF ABSTRACT

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BACKGROUND

The purpose of the Electro Hydraulic Control (EHC) EIIS: TQ! System is to provide a means of controlling speed and/or load of the Turbine/Generator EIIS: TRB!. This system also provides a means of tripping the Turbine when further operation would be hazardous to either the machine or the system or when any other emergency conditions might exist.

The electrical portion of the EHC system is primarily located in the "EHC Cabinet" in the cable room for each unit. The EHC Cabinet contains the protective and trip circuits which are designed to protect the Main Turbine from damage. The Electrical Trip Bus in the EHC Cabinet must be energized with 24 VDC in order to perform several trip functions associated with a trip signal. Should the 24 VDC power supply be lost, the Turbine will trip automatically. This trip is accomplished by de-energizing Master Trip Solenoid Valves "A" and "B".

The 24 VDC Solenoids are verified operable on a weekly basis using procedure PT/2/B/290/05 (Secondary System Protection Test) to perform the 24 VDC Solenoid Test. This testing is performed from the EHC Operator Control Panels located in the Control Rooms. The 24 VDC Solenoid Test verifies the operability of the control switch and indicating lights for:

- a. "TRIP B - RESET - TRIP A" control switch which when operated to the right deenergizes Master Trip Solenoid Valve "A" and, when operated to the left deenergizes "B" solenoid valve. When released this switch returns to the "RESET" position.
- b. "TEST-B" amber indicating light - indicates that "B" valve has actuated.
- c. "TEST-A" amber indicating light - indicates that "A" valve has actuated.

EVENT DESCRIPTION

At 0020 hours on February 5, 1989, with Unit 2 operating at 100% full power, Operations was in the process of performing the weekly secondary system protection test in accordance with procedure PT/2/B/290/05 (Secondary System Protection Test). Operations had just successfully completed the Main Turbine (MT) overspeed trip test portion of the procedure. The next test to be performed was the 24 VDC Solenoid test. At 0023 hours Operations performed step 2.2 of the procedure which placed the Master Trip Solenoid test lever in the trip "A" position. Immediately following the performance of this step the Unit 2 MT tripped. This resulted in an anticipatory reactor trip signal from the MT trip circuitry and a subsequent reactor trip.

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Work Request 19804C was issued by Operations at 0048 hours to have Instrument and Electrical (IAE) investigate the cause of the trip. IAE began troubleshooting the Electro Hydraulic Control System at 0100 hours. The NRC was notified at 0130 hours of the MT/Reactor trip pursuant to 10CFR 50.72. IAE removed the cover from the Master Trip Solenoid test switch and performed a visual inspection of the switch. This inspection did not reveal any apparent problems with the switch. IAE then checked all the screws on the switch for tightness. The screw for the common terminal was found to be slightly loose (approximately 1/4 turn) but IAE did not feel it was loose enough to cause the turbine trip. Following this, IAE requested Operations cycle the switch to enable them to check the physical operation of the switch. The switch appeared to operate smoothly and correctly.

IAE then checked the MT front standard for oil leaks, thinking this could have contributed to the trip. Again, no apparent problems were identified. Operations then reset the MT and repeated the 24 VDC Solenoid test and the switch worked properly. The MT overspeed trip test was repeated and Operations again performed the 24 VDC Solenoid test to determine if this sequence would cause the scenario to be repeated. This testing also revealed no problems with the system or switch. It was decided to bring the MT up to 1800 RPM to aid IAE with their troubleshooting efforts. At 0615 hours reactor power increase to 15% was begun.

At 0859 hours, IAE again inspected the EHC system with the MT at 1800 RPM. No apparent problem could be identified. IAE rechecked all the wiring associated with the Master Trip Solenoid. By eliminating all wiring problems, IAE determined that the only thing that could possibly have failed was the test switch. However, no problem with the switch could be identified. The switch was replaced at 1113 hours as a precautionary measure. Following this, reactor power increase was continued and at 1238 hours the Turbine/Generator was placed on line.

Following the reactor trip the unit was stabilized at hot shutdown. The Main Feedwater Pumps did not trip and consequently, no actuation of the Emergency Feedwater System was incurred. In general, the post trip plant response was as expected. The average Reactor Coolant System (RCS) temperature stabilized at about 556 degrees Fahrenheit approximately 6 minutes into the transient. RCS pressure ranged from approximately 2145 psig just prior to the trip, to a minimum of approximately 1825 psig, and a maximum of approximately 2195 psig. Pressurizer level decreased from the initial pre-trip value of approximately 210 inches to a minimum of approximately 60 inches and then was maintained at approximately 155 inches by starting the 2B High Pressure Injection EHS: BQ! pump. Steam generator (SG) EHS: SG! post-trip levels were maintained at

approximately 27 inches. SG pressure ranged from a pre-trip value of approximately 815 psig to a post-trip value of approximately 1065 psig. Also, the main steam relief valves EIIS: SB! responded adequately. There was no apparent RCS leakage and no actuation of Engineered Safeguards systems EIIS: JE! or pressurizer Power Operated Relief Valves PORV! during this incident.

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CONCLUSIONS

It is concluded that although the Unit 2 Reactor trip was an anticipatory trip caused by a Main Turbine (MT) trip at 100% full power, the root cause of the MT trip could not be determined. This conclusion is based on the fact that Instrument and Electrical (IAE) could not positively identify the cause of the trip even after an extensive troubleshooting analysis had been performed. The analysis did result in the replacement of the Master Trip Solenoid test switch (MTSS) as the most likely cause of the trip. However, inspections and subsequent testing of the MTSS and the Electro Hydraulic Control system did not reveal any abnormal conditions or responses that could have caused the trip. Therefore, the root cause of the Unit 2 Turbine/Reactor trip is classified as unknown.

It is also concluded that Operations response during the trip was appropriate. This conclusion is based on the fact that following the trip Operations responded and stabilized the unit at hot shutdown conditions.

A review of past station incidents revealed that there has been one unit trip in the past year due to an unknown cause. That trip occurred on Unit 3 (See LER 287/88-06) and did not occur during Secondary System Protection testing. However, both trips occurred due to actuation of the Electro Hydraulic Control System from unknown causes. Therefore, this incident is considered to be a recurring event. The corrective actions from the previous trip involved maintenance improvements on the Thrust Bearing Wear Mechanism and would not have prevented this trip. This event is not NPRDS reportable, and no personnel injuries, radiation exposures, or releases of radioactive material resulted from this unit trip.

CORRECTIVE ACTIONS

IMMEDIATE

Stabilize the Unit at hot shutdown conditions.

SUBSEQUENT

Replaced the Master Trip Solenoid test switch.

PLANNED

None

RECOMMENDED

None

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SAFETY ANALYSIS

Following the reactor trip, the unit was stabilized at hot shutdown, emergency feedwater was not actuated, and the Integrated Control System EIS: JA! responded properly. The Operations Control Room personnel safely controlled the reactor following the trip. No actuation of Engineered Safeguards system or pressurizer relief valves occurred, and no Reactor Coolant System leakage was induced.

Although the root cause of the Turbine/Reactor trip could not be determined, there was no reduction in the ability of the normal plant systems, or of the plant emergency systems, or of Operations personnel to safely control the plant. Emergency systems were available to assist Operations personnel in controlling the plant; however, the systems were not required to be used and were not activated the trip response did not degrade plant performance and no safety concerns were generated. Based on the preceding analysis, the health and safety of the public were not affected.

ATTACHMENT 1 TO 8903170289 PAGE 1 OF 1

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DUKE POWER

March 7, 1989

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

LER 270/89-03

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 270/89-03 concerning a Unit 2 reactor trip on February 5, 1989.

This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

PJN/474lerf/td

Attachment

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